Transparency, Reproducibility, and Replicability in Federal Statistics: The Case of LEHD

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The views expressed here are those of the author and do not necessarily represent the policies of the United States Census Bureau.

Qualitative Description of Transparency, Reproducibility and Replicability

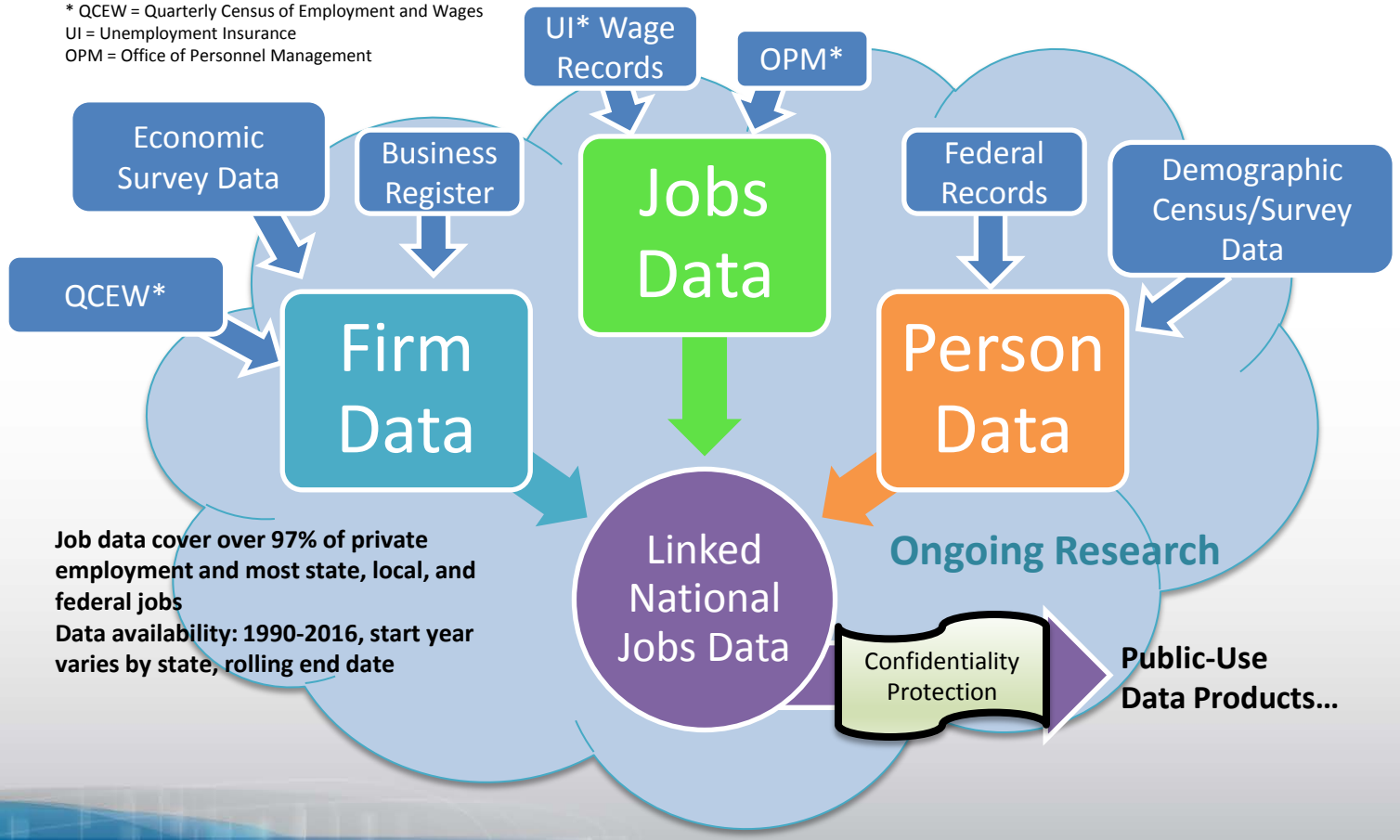
- Transparency
  - Is the data provided to the public in a comprehensible, accessible, and timely manner?
- Reproducibility
  - Do we make a recipes available that allow for the same results?
- Replicability
  - Can we replicate the results?

Mission and Structure

LEHD (Longitudinal Employer-Household Dynamics) Program

- Connects administrative records with census and survey data to produce ***new*** public-use data products as well as microdata for research.
- Links information on employers with employees to provide new data on the US economy. LEHD constructs unique linked employer-employee data for the United States and public-use products from this data (QWI, OTM, OTM-EM, J2J)
- Its unique employer-employee linked dataset covers 97% of jobs in the United States.

LEHD Data Infrastructure



Transparency and Reproducibility

- Transparency
  - Code
  - Description of methodology at different levels
  - Providing a comprehensive suite of documents
- Reproducibility
  - SOPs
  - Availability of Raw Inputs (UI Wage, ES202)
  - System Architecture
  - Code Versioning
  - Redundancy

Replicability: Significance

- Ability to generate, on demand, released data, recreated from original data inputs
- Fostered efficiency in the production of statistical data products
- Stood test of time
- Maintained Census Bureau's reputation as reliable provider of data.

Importance of Metadata System

- Documents and curates all data inputs, outputs, and processes
- Promote reliability, adaptability and replicability
- Statistical, IT and Computational Issues

Metadata Example

Traceability of Files Contributing to a Published QWI Release: LEHD Metadata Example

State: Arkansas (AR) Release: R2017Q1 Demographic: SA_F (Sex by Age for All Firm Types)

Each data release is accompanied by a file specifying a compact notation for metadata. For instance, the R2017Q1 release of Arkansas QWI by sex and age for all firm types would have a file called https://lehd.ces.census.gov/pub/ar/R2017Q1/DVD-sa_f/version_sa_f.txt with the following content:

QWISA_F AR 05 2002:3-2016:2 V4.1.1 R2017Q1 qwipu_ar_20170223_1545

Description of Version File Components		
#	Component	Description
1	QWISA_F	Series Type
2	AR	State Postal Abbreviation
3	05	State FIPS
4	2002:3-2016:2	Data Date Range
5	V4.1.1	Schema Version (see https://lehd.ces.census.gov/data/schema/)
6	R2017Q1	Release Quarter
7	qwipu_ar_20170223_1545	Unique Vintage Identifier (process_id) (state) (vintage)

How Used?

- Tracing back data problems
  - Provides scope of affected vintages
- Core of snapshot creation
  - Input into replicable research

Lessons Learned/Lessons Shared

- Technical
  - Developing a system that is “tight” but “flexible”
  - Computational Challenges
- Human and Organizational Issues
  - Developing a team with the right skill sets
  - Interface between system architect and programming team

Next Steps/Looking for Insights

- Technical
  - Tracking intermediate data file size
  - Automated scheduling
- Human and Organizational
  - Workflow Optimization
  - Legacy thinking
- Expansion to other LEHD data products
  - LODES, J2J

Thank You

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